BioNanoSci. (2017) 7:644–647
https://doi.org/10.1007/s12668-017-0459-2

A Comparative Evaluation of Antimicrobial Effect of *Thymus capitatus* Ethanolic Extract on the Different Respiratory Tract Infections Isolates

Gamal Osman Hassan[1] · **Nazira Karamova**[1] · **Mobarak Abu Mraheil**[2] · **Walid Mohamed**[2] · **Trinad Chakraborty**[2] · **Olga Ilinskaya**[1]

Published online: 15 October 2017

Abstract Natural components, particularly those derived from medicinal plants, provide a promising source of new antimicrobial agents for the treatment of respiratory infections. In this work, we studied the antimicrobial potency of *Thymus capitatus* ethanolic extract against nine microorganisms isolated from clinical material obtained from patients admitted to hospitals in Egypt and Germany with infections of the respiratory tract (bacterial sinusitis, laryngitis, pharyngitis and bronchitis) using the disc diffusion assay and minimum inhibitory concentration (MIC) values. All isolates obtained from the Giessen University Clinic (Germany) exhibit susceptibility of different extent to the plant extract tested. The growth inhibition zone diameters for nine strains were in the range of 13–15.5 mm at a concentration of 5 mg/disc. The extract produced large inhibition zones of 14–17 mm diameters for seven microbial strains obtained in Egypt although it failed to inhibit the growth of isolates of *Staphylococcus epidermidis* and *Enterococcus faecalis*. In fact, most of the respiratory tract infections isolates from Egypt were generally more susceptible to the ethanolic extract of *Thymus capitatus* at lower MIC values than those obtained from Giessen University Clinic MIC values. The results of this study suggest that further delineation of bioactive phytomolecules of *Thymus capitatus* ethanolic extract will improve their potential application for the treatment of respiratory tract diseases.

Keywords Antimicrobial activity · Plant extract · *Thymus capitatus* · Respiratory tract infections · Minimum inhibitory concentration

1 Introduction

Respiratory tract infections (RTIs) are among the most the common and frequent diseases worldwide. RTIs can result in serious complications especially in children, older adults and people with immune system disorders as well as cause significant economic losses [1]. Treatment of RTIs remains an acute problem with the looming crisis of increased resistance to antibiotics and side effects of some drugs and requires studies to supply alternative natural antimicrobial agents with the least unfavourable effects. Therefore, the search for effective drugs derived from plants have accelerated in recent years. The *Thymus* genus belonging to the Lamiaceae family comprises around 300 species and many of them have traditionally been used for treating asthma, bronchitis, coughs, diarrhoea, etc. [2, 3].

The purpose of this study was to evaluate the antimicrobial activity of ethanolic extract from *Thymus capitatus* against microorganisms associated with different respiratory tract infections isolated from patients admitted to hospitals in Egypt and Germany.

2 Material and Methods

Nine different microbial strains including five Gram-negative bacteria *Pseudomonas aeruginosa*, *Escherichia coli*, *Klebsiella pneumoniae*, *Acinetobacter baumannii* and *Enterobacter cloacae*, three Gram-positive bacteria *Staphylococcus aureus*, *Staphylococcus epidermidis*,

✉ Nazira Karamova
nskaramova@mail.ru

[1] Department of Microbiology, Kazan Federal University, 18 Kremlevskaya str, Kazan, Russia 420008

[2] Institute of Medical Microbiology, Justus Liebig University, 81 Schubertstrasse, D35392 Giessen, Germany